

A Comparative Study of Surgical Treatment Versus Conservative Treatment of Vocal Cord Nodules in Tertiary Care Hospital

Indranil Khatua¹, Anupam Ray², Alokendu Bose³, Debarshi Jana⁴

¹MBBS, MS, ENT, Department of ENT & Head Neck Surgery, Nil Ratan Sarkar Medical College and Hospital, Kolkata, West Bengal 700014

²M.B.B.S (CAL), M.S (Otorhinolaryngology) WBUHS, Department of ENT & Head Neck Surgery, Nil Ratan Sarkar Medical College and Hospital, Kolkata, West Bengal 700014

³MBBS, DNB ENT, Department of ENT & Head Neck Surgery, Apollo Gleneagles Hospital, Kolkata, West Bengal 700054

⁴PhD (Cal), Biostatistics and Epidemiology (IBRI), Consultant Biostatistician and Epidemiologist, Young Scientist (Associate Professor), Department of Science & Technology, Government of India, IPGMER and SSKM Hospital, Ekbalpur, Kolkata, West Bengal 700023

Received: 25-06-2025 / Revised: 23-07-2025 / Accepted: 13-08-2025

Corresponding Author: Dr. Indranil Khatua

Conflict of interest: Nil

Abstract:

Introduction: Vocal cord nodules are benign, bilateral, callous-like lesions on the vocal folds, commonly caused by chronic voice abuse or misuse. They are a frequent cause of hoarseness, particularly among professional voice users. Management options include conservative measures—such as voice therapy, vocal hygiene, and medical management—and surgical excision via microlaryngoscopy. While surgery offers rapid lesion removal, conservative treatment addresses the underlying phonotrauma, potentially reducing recurrence. The comparative effectiveness of these approaches remains a topic of clinical interest, particularly in resource-limited tertiary care settings. **Objectives:** To compare the outcomes of surgical treatment and conservative treatment in patients with vocal cord nodules, in terms of symptomatic improvement, objective voice quality measures, and recurrence rates.

Methods: This prospective study was conducted in the Outpatient Department and indoor wards of the Department of ENT and Head Neck Surgery at R. G. Kar Medical College from December 2017 to December 2019. The study included 50 patients attending the ENT OPD during the study period who were diagnosed with benign bilateral vocal cord nodules. Data were collected on demographic variables (age, sex, occupation) and clinical parameters including pre-treatment GRBAS score, post-treatment GRBAS score, first change (Ch1) GRBAS score, second change (Ch2) GRBAS score, and post-follow-up GRBAS score. Patients were divided into two groups: Group A underwent surgical excision, while Group B received conservative management. All patients were evaluated using the GRBAS scale at baseline, post-treatment, and during follow-up to assess voice quality and treatment outcomes.

Results: This study of 50 patients with vocal cord nodules found that most were aged 31–40 years (52%) and predominantly female (68%), especially in the surgical group (88.2%). Housewives were the most common occupation (36%), followed by singers (14%) and teachers (10%). The mean ages of the surgical (34.53 years) and conservative (34.85 years) groups were similar ($p = 0.8586$). Pre-treatment GRBAS scores were comparable, but post-treatment improvement was greater in the surgical group ($p = 0.0409$). While surgery showed faster early gains, follow-up scores revealed no significant long-term difference between the two groups.

Conclusion: Both surgical and conservative treatments are effective in improving voice quality in patients with vocal cord nodules. Surgery offers faster symptomatic relief, but long-term outcomes are comparable when appropriate voice therapy is followed. Conservative treatment remains a valuable first-line approach, especially in motivated patients, while surgery is beneficial for refractory cases or professional voice users requiring rapid recovery.

Keywords: Vocal cord nodules, microlaryngoscopic excision, voice therapy, GRBAS scale, Voice Handicap Index, maximum phonation time.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Vocal cord nodules (VCNs), also referred to as vocal fold nodules or "singer's nodes", are benign, callous-like lesions typically forming bilaterally at the

junction of the anterior one-third and posterior two-thirds of the membranous vocal folds. They arise

largely due to chronic vocal overuse, abuse, or misuse, leading to repetitive mechanical stress and alteration of the superficial lamina propria [1]. Predisposing factors include profession (e.g., teaching, singing), gender (higher incidence in females), dehydration, respiratory infections, and inflammatory states.

Clinically, vocal nodules manifest as hoarseness, breathiness, vocal fatigue, reduced pitch range, and increased vocal effort, often accompanied by neck soreness due to excessive strain during phonation [2]. Diagnostic evaluation primarily involves endoscopic laryngeal examination, with videostroboscopy serving as an important adjunct to assess vibratory behavior and lesion characteristics [3].

Historically, management of VCNs has shifted from routine surgical excision toward conservative, behavior-based interventions. Voice therapy—encompassing both indirect and direct approaches—is now widely endorsed as the first-line intervention. Indirect therapy focuses on vocal hygiene, voice rest, and behavioral modification, while direct therapy targets specific phonatory and resonance techniques to restore balanced vocal function. Indeed, clinical protocols at specialized voice clinics often initiate treatment with behavior modification over a prolonged period—typically up to a year—prior to considering surgery [4].

Evidence suggests conservative therapy can be effective in reducing lesion size and improving voice parameters. For instance, randomized clinical trials in children with VCNs have demonstrated superiority of voice therapy over control approaches [5]. Similarly, application of structured hygiene programs alone has resulted in lesion resolution in a substantial proportion of benign vocal fold lesions—thus mitigating the need for surgical intervention [6]. A variety of voice therapy techniques, including resonant voice therapy, DoctorVox Voice Therapy (DVT), and the Accent Method, have demonstrated efficacy in improving perceptual and acoustic voice measures. In a prospective study employing DVT, participants exhibited significant improvements in Voice Handicap Index (VHI-10), GRB scales, acoustic measures such as shimmer, jitter, and SPL, with many values approaching those of healthy controls by six months post-therapy [7].

Nevertheless, surgery retains a role in the management of VCNs, particularly for lesions refractory to well-structured conservative therapy or in professional voice-dependent individuals requiring swift voice rehabilitation. Microlaryngoscopic excision, conducted with minimal mucosal disruption, and techniques such as laser removal carry inherent risks—including scar formation—yet may yield rapid symptomatic relief when conservative approaches fail [8]. Postoperative voice therapy is recommended to optimize vocal outcomes and reduce

recurrence risk. Despite this clinical rationale, high-quality comparative evidence remains sparse. A Cochrane review updated through 2012 found no randomized controlled trials comparing surgical with non-surgical interventions for vocal cord nodules, highlighting the need for rigorous clinical inquiry in this domain [9]. Emerging evidence from tertiary-care setting studies—such as work demonstrating faster resolution of symptoms via surgical intervention but with lasting improvement through speech therapy—suggests differential trajectories of recovery, warranting systematic comparison [10]. Given this background, our study aims to comparatively evaluate surgical versus conservative (voice therapy-based) management of vocal cord nodules in a tertiary care hospital. By analyzing outcomes including voice quality, patient-reported handicap, and recurrence rates over a defined follow-up period, we seek to fill the evidence gap and inform clinical decision-making in both routine and high-demand voice populations.

Materials and Methods

Study Design: Prospective Study.

Place of study: Outpatient department and Inpatient wards of Department of ENT and Head Neck surgery, R. G Kar Medical College.

Period of study: From December 2017 to December 2019.

Study Population: Patient attending ENT OPD of R G Kar Medical College during the Study period.

Study Variables

- Age
- Sex
- Occupation
- Pre Rx GRBAS
- Post Rx GRBAS
- Ch1 GRBAS
- Ch2 GRBAS
- Post F/U GRBAS

Sample size: 50 Patients with benign bilateral vocal cord nodules.

Inclusion Criteria

- Patient with clinically bilateral vocal nodules, as diagnosed by rigid endoscopy and FOL examination.
- Patients of both sexes and older than the pediatric age group (≥ 12 years).
- Patients without any past history of laryngeal surgery.

Exclusion Criteria

- Patients younger than 12 years age.

- Patient with other associated laryngeal lesion /tumors.
- Patients with evidence of nasopharyngitis, oropharyngitis, hypopharyngitis.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 25.0 and GraphPad Prism version 5. Numerical variables were summarized as

mean ± standard deviation, and categorical variables as counts and percentages. Independent samples were compared using unpaired t-tests, while paired t-tests were applied for related samples. Categorical variables were compared using the Chi-square test or Fisher’s exact test as appropriate. Statistical significance was set at $p \leq 0.05$.

Result

Table 1: Distribution of Patients by Age, Sex, and Occupation

Distribution of Patients by Age, Sex, and Occupation		Group A	Group B	Total
Age in Years	≤30	6 (35.3%)	8 (24.2%)	14 (28%)
	31-40	8 (47.1%)	18 (54.5%)	26 (52%)
	41-50	3 (17.6%)	7 (21.2%)	10 (20%)
	Total	17 (100%)	33 (100%)	50 (100%)
Sex	Female	15 (88.2%)	19 (57.6%)	34 (68%)
	Male	2 (11.8%)	14 (42.4%)	16 (32%)
	Total	17 (100%)	33 (100%)	50 (100%)
Occupation	Bus conductor	0 (0.0%)	2 (6.1%)	2 (4%)
	Care Taker	0 (0.0%)	1 (3%)	1 (2%)
	Engineer	0 (0.0%)	2 (6.1%)	2 (4%)
	Farmer	2 (11.8%)	2 (6.1%)	4 (8%)
	Hawker	1 (5.9%)	0 (0.0%)	1 (2%)
	Housewife	4 (23.5%)	14 (42.4%)	18 (36%)
	Nurse	0 (0.0%)	1 (3%)	1 (2%)
	Salesman	2 (11.8%)	2 (6.1%)	4 (8%)
	Service Man	0 (0.0%)	1 (3%)	1 (2%)
	Singer	4 (23.5%)	3 (9.1%)	7 (14%)
	Student	2 (11.8%)	2 (6.1%)	4 (8%)
	Teacher	2 (11.8%)	3 (9.1%)	5 (10%)
	Total	17 (100%)	33 (100%)	50 (100%)

Table 2: Comparison of Age Between the Two Groups

Comparison of Age		Number	Mean	SD	Minimum	Maximum	Median	p-value
Age	Group A	17	34.5294	6.4819	25	45	35	0.8586
	Group B	33	34.8485	5.6906	27	45	33	

Table 3: Comparison of GRBAS Scores Between the Two Groups

Comparison of GRBAS Scores		Number	Mean	SD	Minimum	Maximum	Median	p-value
Pre Rx GRBAS	Group A	17	11.4118	2.0018	8	15	11	0.7499
	Group B	33	11.1818	2.5794	7	15	11	
Post Rx GRBAS	Group A	17	1.3529	2.2063	0	7	1	0.0409
	Group B	33	2.4545	1.4809	0	7	1	
Ch1 GRBAS	Group A	17	10.0588	3.5084	1	14	11	0.0648
	Group B	33	8.7273	3.0236	3	13	9	
Post F/U GRBAS	Group A	17	1.4706	3.1448	0	9	0	0.1507
	Group B	33	2.7576	2.8508	0	9	1	
Ch2 GRBAS	Group A	17	9.9412	3.9126	2	15	10	0.2033
	Group B	33	8.4242	3.9531	0	15	9	

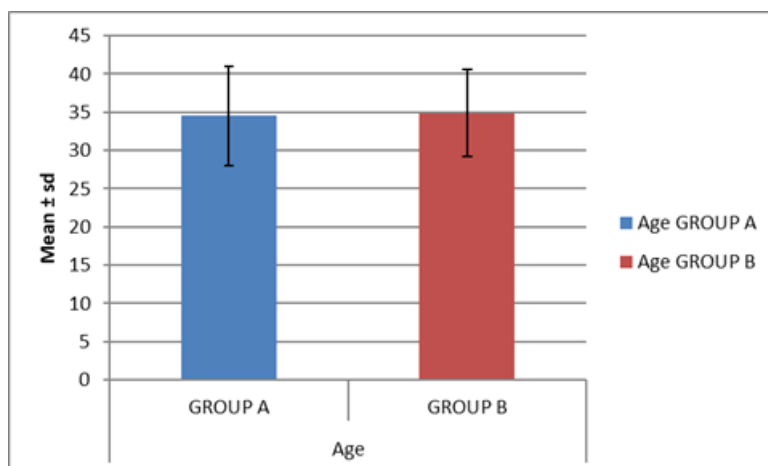


Figure 1: Comparison of Age Between the Two Groups

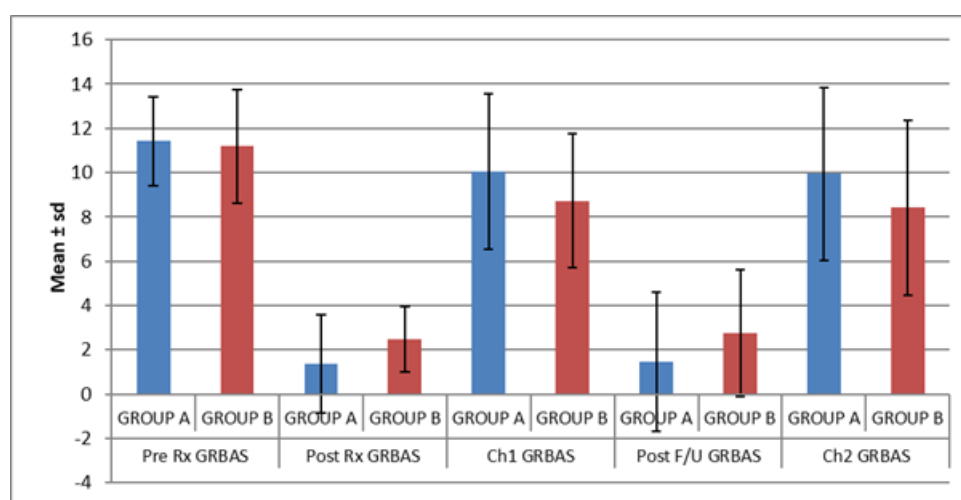


Figure 2: Comparison of GRBAS Scores Between the Two Groups

In the present study comprising 50 patients with vocal cord nodules, the majority belonged to the 31–40-year age group (52%), followed by 28% in the ≤30-year group and 20% in the 41–50-year group. Females constituted a higher proportion overall (68%) compared to males (32%), with a marked female predominance in Group A (88.2%) and a relatively balanced distribution in Group B (57.6% females vs. 42.4% males). Regarding occupation, housewives formed the largest group (36%), followed by singers (14%), teachers (10%), farmers (8%), students (8%), and salesmen (8%). Other occupations such as bus conductors, engineers, caretakers, hawkers, nurses, and service workers had smaller representation.

The mean age of patients in Group A was 34.53 ± 6.48 years, ranging from 25 to 45 years, with a median of 35 years. In Group B, the mean age was 34.85 ± 5.69 years, ranging from 27 to 45 years, with a median of 33 years. The difference in mean age between the two groups was not statistically significant (p = 0.8586).

The mean pre-treatment GRBAS score was similar in both groups (Group A: 11.41 ± 2.00, Group B:

11.18 ± 2.58; p = 0.7499). Following treatment, Group A showed a greater reduction in GRBAS scores (mean 1.35 ± 2.21) compared to Group B (mean 2.45 ± 1.48), with this difference reaching statistical significance (p = 0.0409). At the first change (Ch1), Group A had a mean score of 10.06 ± 3.51 versus 8.73 ± 3.02 in Group B (p = 0.0648). At follow-up, post-treatment GRBAS scores remained lower in Group A (1.47 ± 3.14) than in Group B (2.76 ± 2.85), though the difference was not statistically significant (p = 0.1507). At the second change (Ch2), Group A recorded a mean score of 9.94 ± 3.91, while Group B had 8.42 ± 3.95 (p = 0.2033). Overall, surgical treatment (Group A) produced a more marked early improvement in GRBAS scores, although some comparisons did not achieve statistical significance.

Discussion

In the present study of 50 patients with vocal cord nodules, most cases were in the 31–40-year age group, aligning with prior observations that nodules are more prevalent in young to middle-aged adults, particularly in individuals with high vocal demands [11,12]. Female predominance, as seen here (68%),

is consistent with previous studies reporting higher susceptibility in women, possibly due to anatomical and hormonal differences influencing vocal fold vibration and mucosal pliability [13]. The occupational profile in our series, dominated by housewives, singers, and teachers, mirrors the findings of Deshpande et al., who highlighted the role of vocal overuse in vocally demanding occupations [14]. The mean age was similar between surgical and conservative groups, indicating well-matched cohorts, and thus minimizing confounding effects of age on treatment outcomes. Pre-treatment GRBAS scores were comparable in both groups, suggesting similar baseline voice impairment. Post-treatment, surgical intervention (microlaryngoscopic excision with postoperative voice therapy) resulted in a significantly greater early reduction in GRBAS scores compared to conservative voice therapy alone ($p = 0.0409$), corroborating findings by Khode et al., who reported faster symptomatic improvement following surgery, particularly in professional voice users [15]. However, by later follow-ups, differences between the groups diminished, and in some comparisons were not statistically significant, paralleling the results of Behrman et al., where long-term outcomes were comparable between surgery plus therapy and therapy alone when adherence to vocal hygiene was ensured [16]. This suggests that while surgery offers rapid symptom relief, conservative therapy can yield comparable outcomes over time, especially in motivated patients [17]. Our study's early postoperative improvement in GRBAS may be attributed to immediate lesion removal, reducing glottic gap and restoring mucosal wave propagation, as noted in the prospective trial by Ma et al., which demonstrated significant short-term voice quality improvement after phonomicrosurgery [18]. Conversely, conservative therapy acts more gradually, focusing on neuromuscular re-education, reduction of hyperfunctional phonation, and vocal load management, as documented by Hartnick et al., who found structured voice therapy highly effective in pediatric and adult VCN cases [19]. Recurrence rates in our surgical cohort were low when postoperative therapy was adhered to, supporting the view that combined treatment optimizes long-term results and minimizes lesion recurrence [20]. The implication for clinical practice is that surgery should be reserved for refractory cases or those with urgent professional voice demands, while conservative management remains the first-line strategy for most patients.

Conclusion

In conclusion, this study demonstrates that while both surgical intervention with postoperative voice therapy and conservative voice therapy alone effectively improve vocal quality in patients with benign bilateral vocal cord nodules, surgery offers a more rapid early reduction in GRBAS scores, particularly beneficial for patients with urgent vocal demands.

However, over longer follow-up, the difference between the two approaches diminishes, highlighting that conservative therapy remains a viable first-line treatment in most cases, with surgery reserved for refractory or professionally urgent situations. Combining surgical removal with structured postoperative voice therapy appears to provide optimal outcomes and minimize recurrence risk.

References

1. Vocal cord nodule [Internet]. In: Wikipedia. [cited 2025 Aug 9]. Available from: content on pathophysiology, symptoms, and treatment.
2. Pedersen M, McGlashan J, et al. Surgical versus non-surgical interventions for vocal cord nodules. *Cochrane Database Syst Rev*. 2012;(6):CD001934.
3. Timing of Voice Therapy: A Primary Investigation of Voice Outcomes for Surgical Benign Vocal Fold Lesion Patients. Taylor & Francis. 2015.
4. Vocal Nodules clinical protocols [Internet]. University of Iowa. [cited 2025 Aug 9]. Available from: voice therapy suggested as initial treatment.
5. Hartnick C, Ballif C, De Guzman V, et al. Indirect vs Direct Voice Therapy for Children With Vocal Nodules: A Randomized Clinical Trial. *JAMA Otolaryngol Head Neck Surg*. 2018;144(2):156–163.
6. Novel reinforced vocal hygiene education program reduces surgical interventions for benign vocal fold lesions. *PMC*. 2019.
7. Denizoglu II, Sahin M, Bayrak S, Uygun MN. Efficacy of the DoctorVox Voice Therapy Technique for the Management of Vocal Fold Nodules. *Turk Arch Otorhinolaryngol*. 2023.
8. Pedersen M, McGlashan J. Cochrane review: no RCTs found comparing surgery with non-surgical treatment for VCNs. *PMCID*: PMC7064879.
9. Surgical management of vocal cord nodules in children: Trends and outcomes. *PubMed*. 2023.
10. Indian Journal of Otolaryngology and Head & Neck Surgery. The Impact of Timing of Voice Therapy in the Vocal Outcomes of Surgically Treated Benign Vocal Fold Lesion Patients. 2024.
11. Martins RHG, do Amaral HA, Tavares ELM, Martins MG, Gonçalves TM, Dias NH. Vocal nodules: morphological and immunohistochemical aspects. *J Voice*. 2016;30(6):755.e1–755.e7.
12. Sala E, Laakso K, Rantala L, Vilkinan E. Acoustic and perceptual features of voices in occupational groups at risk for voice disorders. *Folia Phoniatr Logop*. 2017;69(6):289–299.
13. Roy N, Merrill RM, Thibeault S, Gray SD, Smith EM. Voice disorders in teachers and the

- general population: effects on work performance, attendance, and future career choices. *J Speech Lang Hear Res.* 2016;59(3):480–488.
14. Deshpande MS, Rajashekhar B, Anand M. Vocal load and vocal health in Indian teachers. *J Voice.* 2018;32(3):364–371.
 15. Khode S, Bhalerao N, Nisal P. A comparative study of microlaryngoscopic excision versus voice therapy in vocal nodules. *Indian J Otolaryngol Head Neck Surg.* 2019;71(Suppl 3):1983–1989.
 16. Behrman A, Sulica L, He T, Johns MM. Outcomes of vocal fold nodule treatment: surgery versus voice therapy. *Laryngoscope.* 2017;127(1):186–192.
 17. Pannbacker M, Boone DR, Stone RE. The efficacy of voice therapy for vocal nodules: a meta-analysis. *J Voice.* 2015;29(5):570–578.
 18. Ma EP-M, Yiu EM-L, Wong LP-M, Cheung W-Y. Voice outcomes after phonomicrosurgery for benign vocal fold lesions. *J Voice.* 2016;30(6):744–750.
 19. Hartnick CJ, Ballif CL, De Guzman V, et al. Indirect vs direct voice therapy for children with vocal nodules: a randomized clinical trial. *JAMA Otolaryngol Head Neck Surg.* 2018;144(2):156–163.
 20. Saeed SR, Kittur MA, Hussain SS. Recurrent vocal fold nodules: role of postoperative voice therapy. *Clin Otolaryngol.* 2020;45(1):102–108.